

# ***Forest Resource Management Plan***



## ***Northern Landscape***

**Minnesota Forest Resources Council**  
**May 25, 2004**



Minnesota Forest Resources Council (MFRC)

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Document Prepared By: Northern Landscape Regional Committee.



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## Section 1

### Introduction

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#### A. Sustainable Forest Resources Act

The Minnesota State Legislature enacted the Sustainable Forest Resources Act (Minn. Statutes, Chapter 89A) in 1995, which established the MN Forest Resource Council (MFRC) and formalized the state's policy to:

- pursue the sustainable management, use, and protection of the state's forest resources to achieve the state's economic, environmental, and social goals;
- encourage cooperation and collaboration between public and private sectors in the management of the state's forest resources;
- recognize and consider forest resource issues, concerns, and impacts at the site and landscape levels;
- recognize the broad array of perspectives regarding the management, use, and protection of the state's forest resources and establish processes and mechanisms that seek and incorporate these perspectives in the planning and management of the state's forest resources.

The purpose of the MFRC is to develop recommendations to the Governor and to federal, state, county and local governments with respect to policies that result in sustainable management of forests in the state. The policies must:

- acknowledge the interactions of complex sustainable forest resources, multiple ownership patterns, and local to international economic forces;
- give equal consideration to the long-term economic ecological, and social needs and limits of the state's resources;
- foster productivity of the state's forests to provide a diversity of sustainable benefits as site and landscape levels;
- enhance the ability of the state's forest resources to provide future benefits and services;
- foster no net loss of forest land;

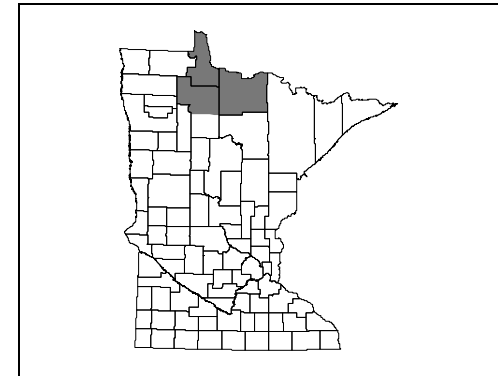
- encourage appropriate mixes of forest cover types and age classes within landscapes to promote biological diversity and viable forest-dependent fish and wildlife habitats;
- encourage collaboration and coordination with multiple constituencies in planning and managing the state's forest resources; and
- address the environmental impacts and implement mitigations as recommended in the *Generic Environmental Impact Statement on Timber Harvesting and Forest Management*.

## B. Regional Forest Resources Committees

The MFRC Landscape Program establishes landscape committees on a regional basis to implement these state policies at the landscape level throughout the state.

The Northern Landscape Region includes Koochiching, Lake of the Woods and the northern half of Beltrami counties (approximately 4.4 million acres). In 2002 the Northern Regional Landscape Committee was organized to begin their work of determining how to achieve long-term forest sustainability considering the economic, ecological, and social characteristics of the landscape.

This report summarizes the work of the Northern Regional Landscape Committee (the Committee) from 2002 through 2003.



## Section 2

### Process Summary



#### A. Formation of the Northern Landscape Regional Committee

The Committee was organized in October of 2002 with 25 people expressing interest in participating. There were 23 people on the mailing list with an active group of 12-15 attending regularly scheduled meetings (see table to the right for mailing list). The Committee chose to work as a single group, scheduling monthly meetings to complete their work by November 2003.

#### **Northern Landscape Regional Committee**

##### **Members:**

Bruce Anderson  
 Rod Bergstrom\*, Bergstrom Forest Products  
 Kara Dunning\*, Boise  
 Steve Early, Boise  
 Robert Ecklund\*  
 Perry Eide\*, Tree Farmer  
 Jim Glaser, Sierra Club  
 Jan Hacker\*, MN Forest Resources Partnership  
 Clyde Hanson\*, Sierra Club  
 Mike Hanson\*, Koochiching County Commissioner  
 Jim Hebner, Boise  
 Dennis Hummitzsch\*, Koochiching County Land Commissioner  
 Wanda LaDuke, Red Lake Band  
 Gene Larson\*, Koochiching County SWCD Board  
 Paul Nevanen\*, Koochiching Economic Development Agency  
 Matt Norton, MN Center for Environmental Advocacy  
 Peggy O'Laughlin-Julson\*, DNR Forestry  
 Greg Snyder\*, Beltrami County Land Department  
 Dave Thomas\*, DNR Forestry  
 Tom Toratti\*, Koochiching County SWCD Board  
 Eldon Voigt\*, Tree Farmer  
 Gloria Whitefeather-Spears\*, Red Lake Band  
 Jim Yount\*  
 \* Active Members (attended half or more meetings)

## **B. Planning Process Overview**

### **General Steps in the Planning Process**

The Committee agreed to the following process:

- The Committee will have three focused meetings (economic, social, ecological)
- At each of the above meetings the Committee will develop the most important goals and strategies for the economic, social, and ecological areas.
- An additional meeting or two will be held to review the goals and strategies of the focus meetings, look at conflicts or tradeoffs, and integrate their results to develop the final desired outcomes, goals, and strategies.
- The Committee will establish measurement systems for all goals, objectives, strategies, and outcomes.
- If agreement on a particular point cannot be reached the discussion will shift up to a more general level until agreement can be reached.
- The Committee will produce a final report for presentation to the Minnesota Forest Resources Council.
- The Committee will assess its progress approximately every five years or when significant new data becomes available and, if needed, modify the report.



## Section 3

### Assessment Information

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#### A. Current Trends and Conditions Assessment

Existing information on the economic, ecological, and social aspects of the landscape was identified and compiled by staff prior to organization of the Committee. This document served as a starting point for discussion, definition of new information, and initial issue identification (refer to MFRC web site at [www.frc.state.mn.us](http://www.frc.state.mn.us) for the assessment).

#### B. “Forest Resource Management in Northern Minnesota, A Landscape Perspective”, Leah Class, November 2002, Report (LP-1102)

This document summarized 10 existing plans in the landscape. The main objective of the report was to highlight landscape issues, visions, goals, and strategies presented in the 10 forest management and planning documents reviewed. Common themes were identified and common goals and strategies were listed under each theme and referenced back to the individual management plan. The purpose of this document was to give the Committee knowledge of what existing plans were being used in the landscape and common themes for future use (refer to MFRC web site at [www.frc.state.mn.us](http://www.frc.state.mn.us) for this report).

#### C. “Koochiching County Comprehensive Land Use Plan”, ARDC, November 2001

Comprehensive plan for the county including land use, natural resources, transportation, community facilities and services, economic development and housing. Plan developed a scenario for what county would look like 25 years from 2001 and then developed goals and strategies for how to achieve the desired condition.

**D. “Beltrami County Comprehensive Plan”, HRDC, 2000**

The Beltrami County Comprehensive Plan includes four sections: Land Use, Transportation, Economic Development, and Housing. Within each of the four sections is an inventory of the existing situation, an analysis of available information, and the plan for that specific area. Each plan component outlines the goals, objectives, and policies for that functional area, and concludes with specific implementation strategies.

**E. Cultural Values of Red Lake Band**

Jody Beaulieu gave a historical perspective of the treaties that shaped the Red Lake Band and spoke to the cultural values toward natural resources of the Ojibwe people. The Ojibwe look at natural resources as having a spiritual value as well as a utilization value. Spiritual values are important considerations in determining how natural resources are managed on Red Lake Tribal lands.

**F. Additional Information**

Council staff working with Jan Hacker, Executive Director, Forest Resources Partnership, prepared a list of information that was derived from discussions of the Northern Regional Committee as well as information that has been helpful in other natural resource plans. The Committee reviewed each item in the list and decided if they wanted to spend additional staff time and money obtaining it. Staff compiled the data requested by topic areas and had an information package ready for each of the three focused meetings (refer to MFRC web site at [www.frc.state.mn.us](http://www.frc.state.mn.us) for this information).

## Section 4

### Focus Meetings

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The Committee held three focus meetings dealing with the topics of economics (May 15, 2003), social (June 19, 2003), and ecology (July 17, 2003). At each meeting the Committee discussed information they had requested of staff for the topic and then developed desired outcomes, goals, and strategies for the topic. Once the meeting was over the Committee did not want to re-visit the topic at future meetings.

## Section 5

### Decision Process

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An additional meeting was held on August 28, 2003, to integrate the results of the three focus meetings into a final set of recommended desired conditions, goals, and strategies to recommend to the Council. The majority of the Northern Regional Committee supported the recommended goals and strategies, however, not all Northern Regional Landscape Planning Committee members were in agreement with the contents of this plan. The Sierra Club did not support the final plan due to the lack of data and specificity of the ecological goals and lack of analysis of the interaction between economic and ecological goals.

The recommendations were submitted to the Landscape Committee for review. The Landscape Committee requested additional work on some of the goals and strategies. The Northern Regional Landscape Committee re-convened on December 11, 2003, to discuss the Landscape Committee's requests and modify their original recommendations to meet those requests. There was still no consensus on the modified recommendations although a majority of Northern Regional Committee members did support them with the Sierra Club not in agreement with the plan for the reasons stated above.

## Section 6

### Recommended Desired Outcomes, Goals, and Strategies

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#### A. Economic

##### **Desired Outcome:**

- A vibrant economy capable of sustaining the Northern Landscape's population and communities.

##### **Goals and Strategies**

**Goal 1.** Stabilize and improve employment and incomes by sustainable use of landscape assets.

##### **Strategies:**

- Encourage utilization of biomass as a renewable fuel source.
- Promote interagency cooperation leading to more timely permitting processes.
- Promote and protect responsible and sustainable use of ATV's through locally developed plans.
- Encourage landowners to develop science-based management plans.
- Evaluate changes in local and state policies that could assist existing industries.
- Provide increased loan funds for business startups and expansions.

**Goal 2:** Increase the Northern Landscape's average mean annual increment (MAI) for timber growth as measured by the USDA FIA program.

##### **Strategies:**

- Support silvicultural productivity research.

- Increase capture of mortality.
- Encourage land managers to harvest at rotation on all timber types.
- Ensure prompt, adequate regeneration on all harvested sites.
- Increase utilization within harvest areas, consistent with the site-level guidelines.
- Promote use of existing silvicultural science in management practices (thinning, insect control, etc.).

**Goal 3:** A stable or rising population as measured by census data.

**Strategies:**

- Create jobs that would attract young adults.

**Goal 4:** Stable employment figures within job sectors that pay at or above the living wage.

**Strategies:**

- Accomplish this through action on the other strategies listed in economic goals 1-8.
- Encourage economic development through existing organizations (i.e. KEDA).

**Goal 5:** Increase farm income.

**Strategies:**

- Promote local consumption of local livestock.
- Identify and promote alternative agricultural products.

**Goal 6:** Maintain or increase timber harvest in the Northern Landscape in a sustainable manner consistent with site-level guidelines.

**Strategies:**

- Encourage landowners to actively and sustainably manage forest lands.
- Identify forest types for increased harvest.

**Goal 7:** Diversify the local economy.**Strategies:**

- Promote the marketing of locally crafted forest products.
- Increase job opportunities in the 60+ age group.
- Promote deer archery hunting.
- Encourage creation of value added forest products.
- Promote businesses that complement existing industries.
- Promote tourism and recreational economies.
- Consider pursuing designation as a JOB zone.
- Identify economic opportunities as a result of increased international trade.
- Increase entrepreneurial capacity by targeting entrepreneurial business opportunities and startups.
- Create an enterprise center network.
- Manage wildlife to increase recreational opportunities.

**Goal 8:** Ensure educational opportunities to promote economic stability.**Strategies:**

- Include retirees as knowledgeable economic/entrepreneurial resources.
- Collaborate with college and high school students to develop detailed plans and studies concerning the goals and strategies in this landscape plan.
- Promote use of county extension services.

**B. Social****Desired Outcomes:**

- A landscape with a distinctive identity where residents and visitors have a strong sense of place and that fulfills social needs.
- A region that balances social needs and landscape planning.

**Goals and Strategies**

**Goal 1.** Maintain and/or increase access to public lands and waters, and private lands open to the public, for sustainable multiple use.

**Strategies:**

- Provide for a diversity of both motorized and non-motorized recreational uses for residents and visitors.
- Enhance facilities at public access points.
- Maintain a stable public land base

**Goal 2:** Increase the well being of the landscape's population.

**Strategies:**

- Enhance housing programs to upgrade housing stock within the landscape.
- Strive for continuous improvement of air and water quality.
- Ensure adequate youth programs exist.
- Recognize that the landscape's multi-generational social and cultural fabric is closely and directly tied to the land.
- Ensure that land use and building codes reflect "FIREWISE".
- Recognize the importance to the communities of good social services such as schools, health care, and roads.

**Goal 3.** Promote future development within existing transportation corridors.

**Strategies:**

- Continue to implement local comprehensive land use plans.



## C. Ecological

**Desired Outcome:** To maintain a viable, healthy functioning ecosystem on the landscape.

### Goals and Strategies

**Goal 1:** Maintain viable populations of existing plant and animal species.

#### Strategies:

- Maintain sufficient diversity and extent of habitat to support existing species
- Implement the Council's *Voluntary Site-Level Forest Management Guidelines*.

**Goal 2:** Ensure the sustainability of natural resource uses.

#### Strategies:

- Ensure that appropriate tree species occupy the appropriate sites.
- Promote the ecological sustainability of public lands that have a fiduciary responsibility to produce a sustainable income stream (for example: county lands, school trust fund lands, con-con lands). Applies to Social Goal 2 as well.

**Goal 3:** Ensure the consideration of the role of natural processes and disturbances in planning and implementing management activities.

#### Strategies:

- Encourage land managers to use forest habitat type classification systems in forest planning and management (for example: Kotar and Almendinger/Hanson).
- Review and consider new research and science in forest land management
- decision-making on an on going basis.
- Gain a better understanding of how age-class distribution has varied over time.

**Goal 4:** Improve information sources for management decision making

**Strategies:**

- Obtain adequate funding and resources
- Establish and use a comparable data base across ownerships.
- Develop a land potential map for the entire landscape.

## Section 7

### Coordination Framework

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Coordination and implementation will occur by landowners in the landscape on an ongoing basis with support from Council staff. The Northern Regional Landscape Committee will meet after this plan is approved to determine how coordination and implementation will begin. The Committee will then meet every 5 years (next meeting April, 2009), or when significant new data becomes available, to assess the impact of any new data and develop an assessment report with recommendations to the MFRC.

## Section 8

### Monitoring Framework



Monitoring information for economic and social goals will be based on standard, accepted measures as compiled by Census and Labor except as noted below. Ecological measurements will have to be revisited once the habitat and land potential maps and analysis are completed. Until that happens data listed here will be used as in-term measures. The year 2003 will serve as the baseline year from which to measure change in the future.

#### A. Economic Goals

**Goal 2:** Increase the Northern Landscape's average mean annual increment (MAI) for timber growth as measured by the USDA FIA program.

##### Net growth of growing stock on timberland(cuft)<sup>i</sup>

1990	Total	Large diameter	Medium diameter	Small diameter	Nonstocked
<b>Beltrami</b>	22,911,799	7,867,692	11,101,648	3,919,025	23,435
<b>Koochiching</b>	32,802,526	6,149,986	17,499,128	9,130,357	23,055
<b>Lake of the Woods</b>	8,935,310	1,951,743	4,406,090	2,652,741	-75,264
<b>Total</b>	64,649,636	15,969,422	33,006,866	15,702,122	-28,774

2002	Total	Large diameter	Medium diameter	Small diameter	Nonstocked	Not collected
<b>Beltrami</b>	25,768,480	6,742,074	15,368,137	3,689,017	137,010	-167,758
<b>Koochiching</b>	20,924,772	1,570,788	14,344,410	4,950,031	59,542	0
<b>Lake of the Woods</b>	8,818,034	1,171,944	6,032,788	1,884,536	206,348	-477,582
<b>Total</b>	55,511,286	9,484,807	35,745,335	10,523,584	402,900	-645,340

Goal 6: Maintain or increase timber harvest in the Northern Landscape in a sustainable manner consistent with site level guidelines.

**Volume of Wood Sold, and Average Price<sup>ii</sup>**

	<b>Beltrami Land Department</b>		<b>Koochiching Land Department</b>		<b>B.I.A. (statewide)</b>		<b>DNR (statewide)</b>		<b>DNR (Beltrami, Koochiching, and Lake of the Woods</b>	
	Cords Sold	Ave. Price	Cords Sold	Ave. Price	Cords Sold	Ave. Price	Cords Sold	Ave. Price	Cords Sold	Ave. Price
<b>Aspen</b>	16,978	\$36.02	38,343	\$32.53	48,062	\$15.54	475,053	\$29.12	140,840	\$27.84
<b>Balm</b>	995	\$27.79	9,715	\$32.02	873	\$6.31	1,814	\$14.77	425	\$7.39
<b>Birch</b>	1,007	\$12.69	2,658	\$10.89	2,475	\$6.12	46,692	\$8.93	4,904	\$8.65
<b>Ash</b>			2,285	\$12.06	7	\$13.82	4,472	\$9.63		
<b>Elm</b>							22	\$33.01		
<b>Oak</b>	21	\$7.00	55	\$21.75	675	\$12.60	10,472	\$42.62	2	\$5.00
<b>Basswood</b>	624	\$18.20	239	\$10.15	371	\$9.19	5,080	\$18.84	26	\$6.04
<b>Other</b>										
<b>Hardwoods</b>	2,093	\$12.55			724	\$4.13	25,949	\$5.60	235	\$5.70
<b>Balsam Fir</b>	2,175	\$28.73	9,095	\$19.91	776	\$11.84	38,916	\$15.91	14,142	\$16.73
<b>White Spruce</b>	152	\$22.57			190	\$14.59	5,702	\$39.86	1,833	\$26.93
							113,679			
<b>Black Spruce</b>			9,463	\$28.38	392	\$13.45	9	\$26.76	54,984	\$26.49
<b>Tamarack</b>			759	\$9.17			57,935	\$4.45	27,306	\$5.52
<b>White Cedar</b>	1	\$4.50	2,494	\$10.70			3,190	\$5.66	1,378	\$3.08
<b>Jack Pine</b>	3,935	\$46.25	2,230	\$43.01	404	\$13.45	52,318	\$36.25	16,456	\$36.10
<b>Red/White</b>										
<b>Pine</b>	2,145	\$57.33	339	\$45.07	1,180	\$36.61	44,972	\$38.66	5,687	\$34.62
							886,267		268,218	
<b>Total</b>	30,126	\$35.21	77,675	\$28.49	56,129	\$15.11	7	\$25.74	8	\$24.82

**Removals of growing stock on timberland (cuft)<sup>iii</sup>**

<b>2002</b>	<b>Beltrami</b>	<b>Koochiching</b>	<b>Lake of the Woods</b>	<b>Total</b>
<b>Eastern white and red pine</b>	0	91,695	0	91,695
<b>Jack pine</b>	256,082	457,516	1,380,260	2,093,859
<b>Spruce and balsam fir</b>	1,194,463	8,077,836	337,088	9,609,387
<b>Other eastern softwoods</b>	92,750	1,429,140	73,124	1,595,015
<b>Select white oaks</b>	211,678	0	0	211,678
<b>Ash</b>	499,488	531,281	0	1,030,769
<b>Cottonwood and aspen</b>	11,831,180	10,465,206	1,738,262	24,034,647
<b>Basswood</b>	305,480	0	0	305,480
<b>Other eastern soft hardwoods</b>	545,084	779,530	0	1,324,614
<b>Total</b>	<b>14,936,205</b>	<b>21,832,205</b>	<b>3,528,734</b>	<b>40,297,144</b>

**B. Social Goals**

**Goal 1:** Maintain and/or increase access to public lands and waters, and private lands open to the public, for sustainable multiple use.

**Public Water Access Points<sup>iv</sup>**

	<b>1998</b>
<b>MN</b>	2,552
<b>Beltrami</b>	54
<b>Koochiching</b>	35
<b>Lake of the Woods</b>	11

### C. Ecological Goals

**Goal 1:** Maintain viable populations of existing plant and animal species.

#### Timberland Cover Type

Species	1977	1990	2001	2001 Beltrami	2001 Koochiching	2001 Lake of the Woods
Jack pine	3.3%	2.7%	3.5%	4.5%	1.4%	8.3%
Red pine	1.1%	2.0%	1.1%	1.9%	0.9%	0.0%
Eastern white pine	0.2%	0.1%	0.2%	0.8%	0.0%	0.0%
Balsam fir	6.0%	4.6%	3.8%	0.6%	4.8%	6.5%
White spruce	0.6%	0.6%	0.9%	1.6%	0.8%	0.0%
Black spruce	16.1%	17.0%	16.9%	4.6%	23.2%	19.8%
Tamarack	6.9%	8.9%	7.9%	8.4%	4.6%	17.5%
Northern white-cedar	10.1%	12.0%	11.6%	7.3%	15.6%	6.5%
Oak / Hickory Group	0.3%	0.7%	1.2%	3.3%	0.3%	0.0%
Elm / Ash / Cottonwood Group	6.7%	8.0%	6.7%	8.5%	6.8%	3.0%
Maple / Beech / Birch Group	2.8%	2.9%	3.1%	8.2%	1.0%	0.0%
Aspen	32.7%	30.4%	31.4%	33.2%	32.1%	25.3%
Paper birch	3.6%	2.6%	4.6%	7.3%	3.5%	3.2%
Balsam poplar	8.4%	6.3%	6.0%	7.0%	4.6%	8.4%
Non stocked	0.9%	1.1%	1.3%	2.9%	0.5%	1.3%
<b>Total (Acres)</b>	<b>2,419,500</b>	<b>2,651,000</b>	<b>2,803,981</b>	<b>868,269</b>	<b>1,485,271</b>	<b>450,441</b>

#### Timberland Size Class

	1977	1990	2001	2001 Beltrami	2001 Koochiching	2001 Lake of the Wood
Large diameter	434,700	617,500	457,276	206,111	200,228	50,936
Medium diameter	1,217,000	993,700	1,138,352	355,683	564,468	218,201
Small diameter	745,400	1,011,500	1,170,760	281,566	713,744	175,450
Nonstocked	22,400	28,300	37,593	24,908	6,831	5,854
<b>Total</b>	<b>2,419,500</b>	<b>2,651,000</b>	<b>2,803,981</b>	<b>868,269</b>	<b>1,485,271</b>	<b>450,441</b>

**Net Growth of Growing Stock on Timberland (cords)<sup>v</sup>**

	<b>Beltrami</b>	<b>Koochiching</b>	<b>Lake of the Wood</b>	<b>Total</b>
<b>Eastern white and red pine</b>	24,335	16,295	2,363	42,993
<b>Jack pine</b>	14,751	6,950	6,194	27,894
<b>Spruce and balsam fir</b>	18,077	92,792	19,590	130,459
<b>Other eastern softwoods</b>	32,527	92,937	27,705	153,169
<b>Select white oaks</b>	9,834	1,404	848	12,086
<b>Select red oaks</b>	3,271	0	0	3,271
<b>Other red oaks</b>	61	0	0	61
<b>Yellow birch</b>	-218	18	0	-199
<b>Hard maple</b>	8,395	2,314	0	10,709
<b>Soft maple</b>	4,336	3,383	0	7,719
<b>Ash</b>	18,722	29,549	4,858	53,130
<b>Cottonwood and aspen</b>	141,388	189,223	50,228	380,839
<b>Basswood</b>	15,303	3,569	-98	18,774
<b>Other eastern soft hardwoods</b>	14,926	-1,069	7,449	21,305
<b>Other eastern hard hardwoods</b>	-218	3	0	-214
<b>Total</b>	305,491	437,367	119,137	861,995



**Goal 2:** Insure the sustainability of natural resource uses.

**Bearing Trees and FIA Trends<sup>vi</sup>**

<b>Species</b>	<b>1908 Bearing Trees</b>	<b>1977 FIA Forestland</b>	<b>1990 FIA Forestland</b>	<b>2001 FIA Forestland</b>
<b>Tamarack</b>	38.5%	8.5%	11.5%	9.0%
<b>Spruce</b>	20.1%	30.5%	24.1%	19.5%
<b>Aspen</b>	9.6%	23.6%	26.1%	29.8%
<b>Cedar</b>	7.6%	9.8%	11.0%	11.7%
<b>Birch</b>	4.8%	2.7%	2.2%	4.3%
<b>Fir</b>	4.7%	4.6%	4.0%	3.6%
<b>Jack Pine</b>	4.2% *	2.3%	2.2%	3.2%
<b>Ash / Elm</b>	2.6%	7.8%	7.2%	6.7%
<b>Red Pine</b>	2.4% *	0.8%	1.7%	1.0%
<b>Other</b>	2.2%	2.6%	4.0%	4.1%
<b>White Pine</b>	1.9% *	0.2%	0.1%	0.2%
<b>Balm-of-Gilead</b>	1.0%	6.1%	5.3%	5.8%
<b>Oak</b>	0.4%	0.2%	0.6%	1.1%

<sup>i</sup> Source - USDA – Forest Inventory and Analysis, 1990,2002; note numbers are partially different because of different inventory collection methods and also 2002 is only 60% complete.

<sup>ii</sup> Source – DNR 2002 Public Stumpage Price Review and Price Index

<sup>iii</sup> Source – USDA – Forest Inventory and Analysis, 2002

<sup>iv</sup> Source – DNR Waters, Water Access Sites Database

<sup>v</sup> Source – 1990 forest inventory and analysis; Note used a conversion factor of 75 cuft per cord

<sup>vi</sup> Source – Bearing Tree dataset, DNR Data Deli, FIA from <http://www.ncrs.fs.fed.us/4801/FIADB/> .